

## THAT WHICH IS CLAIMED:

1. A signal processing module for wireless applications, comprising:  
a liquid crystal polymer (LCP) layer having a first surface and a second  
5 surface opposite the first surface;  
a first patterned metal layer on the first surface of the LCP layer;  
a second patterned metal layer on the second surface of the LCP layer,  
wherein the first and second metal layers are patterned to form integrated components  
such that the first and second metal layers interact with one another to form a first  
10 resonator and a second resonator;  
a first prepreg layer on the first metal layer opposite the LCP layer and a  
second prepreg layer on the second metal layer opposite the LCP layer; and  
a first laminate layer on the first prepreg layer opposite the first metal layer,  
and a second laminate layer on the second prepreg layer opposite the second metal  
15 layer.
2. The module of Claim 1, wherein the first resonator comprises a first  
inductor formed in the first patterned metal layer and a second inductor formed in the  
second patterned metal layer, wherein the first inductor is connected by a first  
20 microvia to the second inductor.
3. The module of Claim 1, wherein the first resonator is magnetically  
coupled to the second resonator.
- 25 4. The module of Claim 1, further comprising a third resonator formed in  
the first and second metal layers and electrically connecting the first resonator to the  
second resonator, wherein the third resonator provides a primary attenuation zero in a  
stopband.
- 30 5. The module of Claim 1, wherein the first and second resonators  
comprise transmission line resonators.

6. The module of Claim 1, wherein the first and second resonators comprise one or more of co-planar waveguide, stripline, and microstrip topologies.

5 7. The module of Claim 1, further comprising a third metal layer on a first surface of the first laminate layer and patterned to form a first capacitor plate, and a fourth metal layer on a second surface of the first laminate layer opposite the first surface and patterned to form a second capacitor plate, wherein the first capacitor plate and second capacitor plate form a parallel plate capacitor.

10

8. The module of Claim 1, further comprising a first shielding layer on the first laminate layer opposite the first prepreg layer and a second shielding layer on the second laminate layer opposite the second prepreg layer.

15 9. The module of Claim 1, wherein the integrated components include at least one of capacitors and inductors.

10. A diplexer for a multi-band wireless application, comprising:  
a liquid crystal polymer (LCP) layer having a first surface and a second  
20 surface opposite the first surface;  
a first patterned metal layer on the first surface of the LCP layer;  
a second patterned metal layer on the second surface of the LCP layer,  
wherein the first and second metal layers are patterned to form integrated components  
such that the first and second metal layers interact with one another to form a first  
25 filter and a second filter connected by a common port;  
a first prepreg layer on the first metal layer opposite the LCP layer, and a  
second prepreg layer on the second metal layer opposite the LCP layer; and  
a first laminate layer on the first prepreg layer opposite the first metal layer,  
and a second laminate layer on the second prepreg layer opposite the second metal  
30 layer.

11. The diplexer of Claim 10, wherein the first filter comprises a first inductor formed in the first patterned metal layer and a second inductor formed in the second patterned metal layer, wherein the first inductor is connected by a first microvia to the second inductor.

5

12. The diplexer of Claim 10, wherein the first and second metal layers comprise one or more of co-planar waveguide, stripline, and microstrip topologies.

13. The diplexer of Claim 10, further comprising a third metal layer on a first surface of the first laminate layer and patterned to form a first capacitor plate, and a fourth metal layer on a second surface of the first laminate layer opposite the first surface and patterned to form a second capacitor plate, wherein the first capacitor plate and second capacitor plate form a parallel plate capacitor.

14. The diplexer of Claim 10, further comprising a first shielding layer on the first laminate layer opposite the first prepreg layer and a second shielding layer on the second laminate layer opposite the second prepreg layer.

15. The diplexer of Claim 10, wherein the integrated components include at least one of capacitors and inductors.

16. A balun for a wireless application, comprising:  
a high K organic layer having a first surface and a second surface opposite the first surface;  
a first patterned metal layer on the first surface of the LCP layer;  
a second metal patterned metal layer on the second surface of the LCP layer, wherein the first and second metal layers are patterned to form integrated components such that the first and second metal layers interact with one another to form a first passive device and a second passive device;  
a first prepreg layer on the first metal layer opposite the LCP layer, and a second prepreg layer on the second metal layer opposite the LCP layer; and

a first outer organic layer on the first prepreg layer opposite the first metal layer, and a second outer organic layer on the second prepreg layer opposite the second metal layer.

5           17.    The balun of Claim 16, wherein the first outer organic layer comprises one of a laminate layer, LCP layer or high K organic layer.

10           18.    The balun of Claim 16, wherein the first metal layer is patterned to form a first capacitor plate and the second metal layer is patterned to form a second capacitor plate, and further comprising a third metal layer on the first outer organic layer patterned to form a third capacitor plate, and wherein the first, second and third capacitor plates form a capacitor.

15           19.    The balun of Claim 16, wherein the integrated components include at least one of capacitors and inductors.

20           20.    The balun of Claim 16, further comprising a first shielding layer on the first outer organic layer opposite the first prepreg layer and a second shielding layer on the second outer organic layer opposite the second prepreg layer.

21.    A signal processing module for multi-band wireless applications, comprising:  
a first liquid crystal polymer (LCP) layer having a first surface and a second surface opposite the first surface;  
25       a first patterned metal layer on the first surface of the first LCP layer;  
a second patterned metal layer on the second surface of the first LCP layer, wherein the first and second metal layers are patterned to form integrated components such that the first and second metal layers interact with one another to form at least a first filter and a second filter connected by a common port;  
30       a second LCP layer having a first surface and a second surface opposite the first surface;

a third patterned metal layer on the first surface of the second LCP layer;  
a fourth patterned metal layer on the second surface of the second LCP layer,  
wherein the third and fourth metal layers are patterned to form integrated components  
such that the third and fourth metal layers interact with one another to form at least a  
5 first filter and a second filter connected by a common port;  
a first prepreg layer disposed between the first and second LCP layers;  
a second prepreg layer on the second metal layer opposite the first LCP layer,  
and a third prepreg layer on the third metal layer opposite the second LCP layer; and  
a first outer organic layer on the second prepreg layer opposite the second  
10 metal layer, and a second outer organic layer on the third prepreg layer opposite the  
third metal layer.

22. The module of Claim 21, further comprising a first shielding layer on  
the first outer organic layer opposite the second prepreg layer and a second shielding  
15 layer on the second outer organic layer opposite the third prepreg layer.

23. The module of Claim 21, wherein the first outer organic layer  
comprises one of a laminate layer, LCP layer or high K organic layer.

20 24. The module of Claim 21, further comprising a first RCF layer on first  
outer organic layer opposite the second prepreg layer; and  
a second RCF layer on the second outer organic layer opposite the third  
prepreg layer.

25